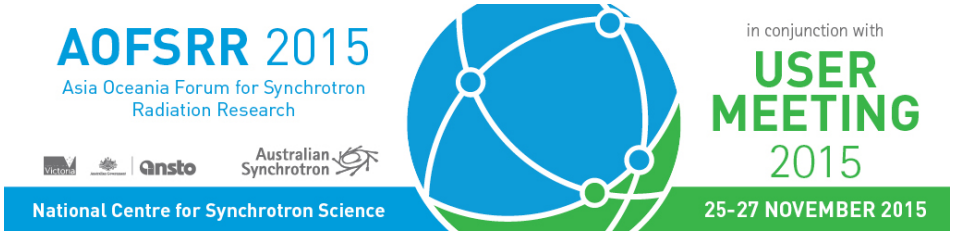

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XAS Studies of Mixed Main Group Tin Cluster Materials

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Layered oxide materials that combine unusual intermetallic architectures and transition metal oxides similar to naturally occurring mineral architectures are promising candidates for the study of strongly correlated-electron systems. One of the key benefits of systems that contain naturally occurring mineral structures is they provide a widely characterized platform to stabilize new architectures such as intermetallic clusters that prove otherwise highly unstable in isolation. The parent compound for this study, Fe4Si2Sn7O16 [1], provides a novel situation in oxide compounds. It is described as a layered composite of FeSn6 oxide clusters and Sn-doped Fayalite-type within the one structure resulting in two nearly perfectly 2D oxide systems. To date, all reported tin oxide clusters have been shown to be electron precise, i.e. they follow the 18 valence electron rule. Whilst several attempts have been made to produce electron rich cluster materials in the tin oxide system, only the incorporation of highly stable "natural ligand layers" such as Fayalite has allowed for the stabilization of electron-rich 3d-transition metal clusters. In this presentation we will describe the experimental results of combined Mössbauer/XAS studies that have led to the discovery of the first 19-electron cluster found in the tin system.

[1] T. Söhnel, P. Böttcher, W. Reichelt, F.E. Wagner; Z. Anorg. Allg. Chem. 624, 708 (1998).

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